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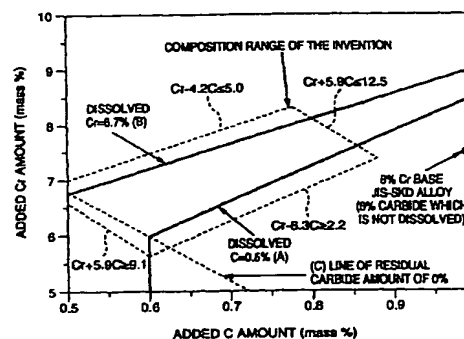
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(54) **Tool steel with excellent workability, machinability and heat treatment characteristics, and die using same**

(57) Provided is a tool steel which contains, by weight, C and Cr in both of which  $(Cr + 5.9 \times C)$  is 9.1 to 12.5,  $(Cr - 4.2 \times C)$  being not more than 5 and  $(Cr - 6.3 \times C)$  being not less than 2.2. In addition to these elements, this tool steel preferably contains 0.1 to 0.6% Si, 0.1 to 1.2% Mn, at least one of Mo and W of 0.6 to 1.25% in total in terms of  $(Mo + 1/2W)$ , less than 0.5% V, not more than 0.12% S, not more than 100 ppm of Ca, and the balance Fe and incidental impurities. Moreover, in this tool steel, the Cr segregation range in matrix after hardening is not more than 1% by weight, or the maximum tempering hardness by tempering at a temperature of not lower than 500°C is not less than 57 HRC, or a size variation due to heat treatment occurring by tempering at a temperature of not lower than 500°C is not more than 0.1% relative to the size measured just before hardening in terms of linear expansion coefficient and a size variation due to heat treatment by tempering at 490°C is not more than 0. Provided is also a die made by tempering the steel of the invention to a hardness of not less than 55 HRC and cutting the steel.

**FIG.2**





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# EUROPEAN SEARCH REPORT

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EP 99 12 3519

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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 28 November 2001	Examiner Patton, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82